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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,424	10/18/2005	Masashi Tamura	1163-0536PUS1	1484

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EXAMINER	
NEWMAN, MICHAEL A	

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/553,424	TAMURA ET AL.	
	Examiner	Art Unit	
	MICHAEL A. NEWMAN	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-9* is/are rejected.

7)☒ Claim(s) *2* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment received on December 31st, 2007 has been entered.

2. In view of the amendment to the claims, the amendment of claims 1 and 2 and the addition of claim 9 are acknowledged.

3. In view of the amendment to claim 2, the 35 U.S.C. 112 2nd and 35 U.S.C. 103 rejections of claim 2 are withdrawn.

Response to Arguments

4. Applicant's arguments received on December 31st, 2007 with respect to the 35 U.S.C. 102 rejection of claims 1 – 4 have been considered but are moot in view of the new ground(s) of rejection.

5. Applicant's arguments filed on December 31st, 2007 have been fully considered but they are not persuasive.

a. In pages 6 – 8 of the Remarks received on December 31st, 2007, with regards to the rejections of the independent claims 5 and 8 under 35 U.S.C. 103 over Kotaki et al. (U.S. Patent No. 5,200,841), "Kotaki", Adams (U.S. Patent No. 7,023,487), "Adams" and Cho (U.S. Patent No. 7,142,239), "Cho" [re: claim 8], Applicant's Representative submits that Kotaki "does not perform any binarization on the calculated feature values themselves". Specifically, Applicant's Representative submits that the mean value used to determine the threshold by Kotaki may be viewed as a calculated feature value; however, since Kotaki only *uses* such threshold to binarize the pixel values, Kotaki is not actually

binarizing the calculated feature values. The Examiner agrees that, given Applicant's Representative's interpretation of 'featured values', indeed Kotaki does not binarize them. However, the Examiner notes that Kotaki obtains an image and divides it into a two-dimensional NxN image window corresponding to a small field of vision to retrieve image data of a predetermined pixel and of plural pixels around the predetermined pixel. The values of the pixels resulting from such a *division* are then binarized according to a threshold based on the mean (Kotaki Col. 3 line 65 - Kotaki Col. 4 line 12). The Examiner respectfully submits that it would be a reasonable interpretation by one of ordinary skill in the art, that the values extracted by dividing an image into an NxN window would be 'feature values'. In fact, pertaining to the same field of endeavor, Atkinson (U.S. Patent No. 6,961,476), "Atkinson", teaches that a "feature is a group of contiguous pixels [...] having similar values. Contiguous pixels [...] may be defined in any suitable manner [and] may include only those sharing an edge [or] as those which can be connected by a straight line segment that does not pass through any third pixel..." Therefore, the Examiner respectfully insists that Kotaki does teach binarizing 'feature values', calculated by dividing the image into NxN sections. The above interpretive clarifications are included in the standing 103 rejections of claims 6 and 8. Based on this reasonable interpretation of the prior art and the claims, the Examiner respectfully insists that Kotaki in view of Adams and Cho teach all the limitations of the independent claims as set forth in the 103 rejections below.

b. In page 7 of the Remarks, Applicant's Representative argues that the secondary reference, Adams, alone or in combination with Kotaki, does not teach binarizing the calculated feature values. However, as discussed above, Kotaki does teach such a limitations such that the additional reference does not need to teach it in order to establish a *prima facie* case of obviousness as set forth under 35 U.S.C. 103.

Claim Rejections - 35 USC § 102

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 1, 3 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Acharya et al. (U.S. Patent No. 6,229,578). Hereinafter referred to as Acharya.

a. Regarding claims 1, 3 and 4, Acharya teaches an image processing method comprising: a feature value calculation step of calculating feature values of micro regions in a specified region having a pixel of interest at a center **(Col. 4 lines 29 – 32)**, from pickup results of an image pickup device that has a color filter with a particular color at each of pixels arrayed two-dimensionally **(Col. 3 lines 62 – 64 and Col. 4 lines 15 – 26)**; an edge intensity value calculation step of calculating an edge intensity value in a neighborhood of the pixel of interest from the feature values of the micro regions calculated by the feature value calculation step **(Col. 4 lines 43 – 52)**; a filter value calculation step of calculating a low-pass filter value of the pixel of interest from the image signal values of

neighboring pixels which have a same color component as the pixel of interest **(Col. 5 lines 45 – 48)**; and an image signal value correction step of correcting the image signal value of the pixel of interest by using the edge intensity value calculated by the edge intensity value calculation step and the low-pass filter value calculated by the filter value calculation step **(Col. 5 lines 52 – 54) [Note that the replacement or correction with either a linear average or a multi-level median filter result—both varying forms of low-pass filtering—depends on the gradient intensity]**, wherein said image signal value correction is performed **either** before **or** after a color interpolation **(Col. 6 lines 2 – 5)**.

Claim Rejections - 35 USC § 103

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 5, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kotaki et al. (U.S. Patent No. 5,200,841) in view of Adams (U.S. Patent No. 7,023,487). Hereinafter referred to as Kotaki and Adams respectively.

a. Regarding claim 5, Kotaki teaches an image processing method comprising: a feature value calculation step of calculating feature values of micro regions in a specified region having a pixel of interest at a center, from pickup results of an image pickup device that has a color filter with a particular color at each of pixels arrayed two-dimensionally **(Kotaki Col. 1 lines 59 – 65 and Col. 11 lines 9 - 10)**; a binarization step of binarizing the feature values of the micro

regions calculated by the feature value calculation step **(Kotaki Col. 1 line 68 – Col. 2 line 6) [Note that Kotaki divides the input image into NxN windows and retrieves data of a predetermined pixel and of the plural pixels around it, these values, which can be considered feature values, are binarized]**; a contour detection step of detecting a contour using the feature values binarized by the binarization step **(Kotaki Col. 2 lines 11 – 19)**. However, **Kotaki fails to teach** an image signal value correction step of correcting an image signal value of the pixel of interest using image signal values of a plurality of pixels including the pixel of interest in a same direction as the contour detected by the contour detection step. **Pertaining to the same field of endeavor, Adams teaches a deinterlacer system that detects the presence and orientation of edges and calculates image pixel values based on the detected edges. Specifically, Adams teaches carries out interpolation from source image pixels located along the detected edge orientation (Adams Col. 3 lines 4 – 7). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the edge detection result of Kotaki to carryout interpolation of the pixel of interest based on the pixels along the detected edge, as taught by Adams, in order to avoid jagged or objectionable looking artifacts (Adams Col. 1 56 – 59).**

b. Regarding claim 6, Kotaki as modified by Adams with regard to the independent claim 5 further teach that the image signal value correction step corrects the image signal value of the pixel of interest by carrying out weighted

addition of the image signal values of the plurality of pixels in the same direction as the contour **(Adams Col. 16 lines 10 – 12 and lines 27 – 28 – See Fig. 9A)**.

c. Regarding claim 7, Kotaki teaches the image processing method according to claim 5, wherein the contour detection step detects the contour by carrying out pattern matching of distribution of the feature values in the specified region binarized by the binarization step with preset binary distribution **(Kotaki Col. 2 lines 11 – 14)**.

10. Claims 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kotaki et al. (U.S. Patent No. 5,200,841) in view of Adams (U.S. Patent No. 7,023,487) and Cho (U.S. Patent No. 7,142,239). Hereinafter referred to as Kotaki, Adams and Cho respectively.

a. Regarding claim 8, Kotaki teaches an image processing method comprising: a feature value calculation step of calculating feature values of micro regions in a specified region having a pixel of interest at a center, from pickup results of an image pickup device that has a color filter with a particular color at each of pixels arrayed two-dimensionally **(Kotaki Col. 1 lines 59 – 65 and Col. 11 lines 9 - 10)**; a binarization step of binarizing the feature values of the micro regions calculated by the feature value calculation step **(Kotaki Col. 1 line 68 – Col. 2 line 6) [Note that Kotaki divides the input image into NxN windows and retrieves data of a predetermined pixel and of the plural pixels around it, these values, which can be considered feature values, are binarized]**; a

contour detection step of detecting a contour using the feature values binarized by the binarization step **(Kotaki Col. 2 lines 11 – 19)**. However, **Kotaki fails to teach** an image signal value correction step of correcting an image signal value of the pixel of interest using image signal values of a plurality of pixels including the pixel of interest in a same direction as the contour detected by the contour detection step. **Pertaining to the same field of endeavor, Adams teaches a deinterlacer system that detects the presence and orientation of edges and calculates image pixel values based on the detected edges. Specifically, Adams teaches carries out interpolation from source image pixels located along the detected edge orientation (Adams Col. 3 lines 4 – 7). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the edge detection result of Kotaki to carryout interpolation of the pixel of interest based on the pixels along the detected edge, as taught by Adams, in order to avoid jagged or objectionable looking artifacts (Adams Col. 1 56 – 59).** Although Kotaki suggests that when no edges are detected, the results of other circuits can be used **(Kotaki Col. 8 lines 14 – 16)**, **Kotaki further fails to teach** an edge intensity value calculation step of calculating, when the contour is not detected by the contour detection step, an edge intensity value in a neighborhood of the pixel of interest from the feature values of the micro regions calculated by the feature value calculation step; a filter value calculation step of calculating a low-pass filter value of the pixel of interest from the image signal values of neighboring pixels which have a

same color component as the pixel of interest; and a second image signal value correction step of correcting the image signal value of the pixel of interest by using the edge intensity value calculated by the edge intensity value calculation step and the low-pass filter value calculated by the filter value calculation step. **Pertaining to the same field of endeavor,** Cho teaches an edge intensity value calculation step of calculating an edge intensity value in a neighborhood of the pixel of interest from the feature values of the micro regions calculated by the feature value calculation step **(Col. 17 lines 48 – 51 and line 59 to Col. 18 line 5) [Note the example of the calculation of at least the first directional coefficient for G components given in Col. 18 lines 34 – 60]**; a filter value calculation step of calculating a low-pass filter value of the pixel of interest from the image signal values of neighboring pixels which have a same color component as the pixel of interest **(Col. 15 line 59 – 64) [Note Fig. 6 blocks 611 - 621; which effectively use the G components of neighboring pixels in Fig. 1 to obtain a low-pass signal]**; and an image signal value correction step of correcting the image signal value of the pixel of interest by using the edge intensity value calculated by the edge intensity value calculation step and the low-pass filter value calculated by the filter value calculation step **(Col. 23 lines 47 – 60) [Note that this is essentially implemented in Fig. 6, in which the values of the directional coefficients corresponding to the edge amount and direction are used to select the low passed values. As Cho explains, equations 1 and 2 form the mathematical basis for adaptively applying the**

low passing based on the detected edge degree.] **Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to feed the output of Kotaki's multi-value image windowing step (Kotaki Fig. 1 element 3) to Cho's edge directional coefficient calculation step in order to enhance image sections containing edges or features too weak or gradual to be detected by Kotaki's binarization.**

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kotaki et al. (U.S. Patent No. 5,200,841) in view of Adams (U.S. Patent No. 7,023,487) as applied to claim 5 above, and further in view of Acharya et al. (U.S. Patent No. 6,229,578). Hereinafter referred to as Kotaki, Adams and Acharya, respectively.

a. Regarding claim 9, Kotaki in view of Adams teach all the limitations of the independent claim 5 as set forth in the 103 rejection of claim 5 above. However, **they fail to teach** calculating a low-pass filter value of the pixel of interest from image signal values of neighboring pixels which have the same color component as pixel of interest. **Pertaining to the same field of endeavor, Acharya teaches a noise-reduction system that is responsive to the presence of edges. Specifically, Acharya teaches that because noise may also be present in edge regions, it is necessary to perform smoothing on the pixel. The smoothing is linear averaging that replaces the pixel with an average of itself and neighboring pixels having a similar intensity (Acharya Col. 4 lines 43 – 52).** **Therefore, it would have been obvious to one of ordinary**

skill in the art at the time the invention was made to carryout a smoothing or low-pass filtering of the pixel of interest using neighboring pixels with similar characteristics, as taught by Acharya, in order to reduce noise while avoiding separate edge features to be combined together improperly (Acharya Col. 5 lines 57 – 60).

Allowable Subject Matter

12. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Yang et al. (U.S. Patent No. 6,377,313) teaches an edge enhancing system in which an initial edge signal is extracted, passed through non-linear correction transfer function to produce a second edge signal which is then added to the original edge signal to obtain enhanced edges.

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL A. NEWMAN whose telephone number is (571)270-3016. The examiner can normally be reached on Mon - Thurs from 9:30am to 6:30pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir A. Ahmed can be reached on (571) 272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

M.A.N.

/Samir A. Ahmed/

Supervisory Patent Examiner, Art Unit 2624